DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9: Clamping device according to claim 1, characterized in that the device is substantially integrated in the part intended for mounting in a machining device.

It is unclear which two entitles are to be "substantially integrated" in claim 9. Claim 9 states "a clamping device according to claim 1…" In claim 1, the "clamping device" is the "hydromechanical clamping device", or applicant's entire claimed invention. Claim 9 continues to state, "…characterized in that the device is substantially integrated in the part intended for mounting in a machining device." If the "clamping device" is applicant's entire claimed invention, there is no other entity beside the "clamping device" in which to "substantially integrate" "the clamping device". This is unclear.

In addition, it is unclear what the term "the part intended for mounting" refers to.

Further, it is unclear whether the word "device" in the phrase "characterized in that the device" refers to the "hydromechanical clamping device" of claim 1 or the "machining device" at the end of claim 9.

For analysis of claim 9 concerning claim rejections below, the examiner reads the phrase "… characterized in that the device is substantially integrated in the part intended for mounting in a machining device" to mean "… characterized in that the mandrel pin is substantially integrated in the portion of the mandrel intended for mounting in a machining device".

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1- 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Varnau (6,497,419) as evidence from Heineman et al in "Machine Tools Processes and Applications", Canfield Press, 1979.

Claim 1: Hydromechanical clamping device which in one end thereof is designed as a mandrel pin with an outer envelope surface onto which one or more tools may be mounted, characterized in that the mandrel pin comprises outer expanding means (6), the outer surface of which consisting of said envelope surface, with a relatively thin, radially expandable wall and a conical inner surface in the axial direction, the mandrel pin further comprising a centre pin (8), the outer diameter of which being smaller than the diameter of the inner surface of said means, wherein in the space between the centre pin (8) and the expanding means there are arranged intermediate means (7) connected to a piston (9), which intermediate means (7) are displaceable in the axial direction by means of hydraulically operating means, wherein the intermediate means (7) and the outer expanding means (6) have interacting conical surfaces which at axial displacement of the intermediate means in one direction cause radial expansion of the outer expanding means (6), wherein axial displacement of the intermediate means in the other direction causes relief with radial contraction of the outer expanding means (6).

Per **Claim 1,** Varnau discloses a hydromechanical clamping device (2) (Fig 1). This clamping device would be considered a "mandrel". Heineman on p. 416 defines "mandrel" as "a shaft onto which an object to be machined may be pressed or held."

The invention is stated to be a device that is related to generally "clamping components in place" (col 1, 6-7). Fig 1 and Fig 5 show the device in the general shape of a shaft. As such, Varnau's invention is a "mandrel".

The "mandrel pin" is the part of the mandrel where the tool may be mounted. Varnau discloses in Fig 1 one end of his clamping device holding a workpiece (100) (Fig 1). The workpiece is mounted on the outer envelope surface of part 16 (Fig 1). "One or more tools may be mounted" on the outer envelope surface of part 16 in place of the workpiece.

The "mandrel pin" is comprised of an outer expanding means (16), which is a relatively thin, radially expandable wall and has a conical inner surface in the axial direction (16c); a center pin (14a), which has a smaller outer diameter than the inner surface of the outer expanding means (16); in the space between the center pin (14a) and the outer expanding means (16) are arranged an intermediate means (22) and a piston (32) (Fig 1). The piston and the intermediate means are connected: "Collet drawbar 22 and collet piston 32 can be connected in any manner, conventional or otherwise," (col 5, 37-39).

The intermediate means (22) are displaceable in the axial direction by means of hydraulic fluid in the clamping chamber (10); the intermediate means (22) and the outer expanding means (16) have interacting conical surfaces (16c) which at axial displacement of the intermediate means causes radial displacement of the outer expanding means (16): "Pressurized hydraulic fluid is supplied to clamping hydraulic chamber 10, causing drawbar piston 58 and collet piston 32 to move toward end cap

50. As collet piston 32 advances, collet drawbar 22 engages expansion collet 16, expanding it outwardly to engage the inner surface of workpiece 100, thereby radially locating and securing workpiece 100. Collet piston 32 advances until the force exerted thereon by the hydraulic pressure equals the axial force generated by expansion of expansion collet 16." (col 9, 1-10).

Movement of the intermediate means in the opposite direction causes relief with radial contraction of the outer expanding means: "To unload workpiece 100, pressurized hydraulic fluid is supplied to unclamping hydraulic chamber 12, causing drawbar piston 58 and collet piston 32 to move away from end cap 50. Spring 54a assists in returning drawbar piston 58. As drawbar piston 58 extends drawbar 14, fingers 40 retract as described above. Eventually drawbar piston 58 and collet piston 32 reach the full extent of their travel and stop. At that point, expansion collet 16 will have ceased applying radial force on workpiece 100," (col 9, 23-31).

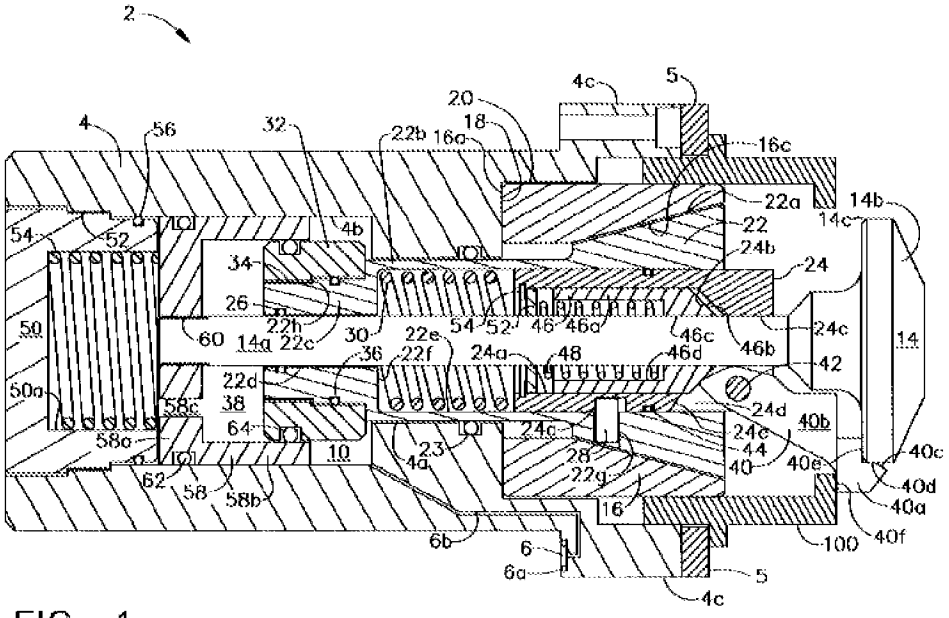


FIG. 1

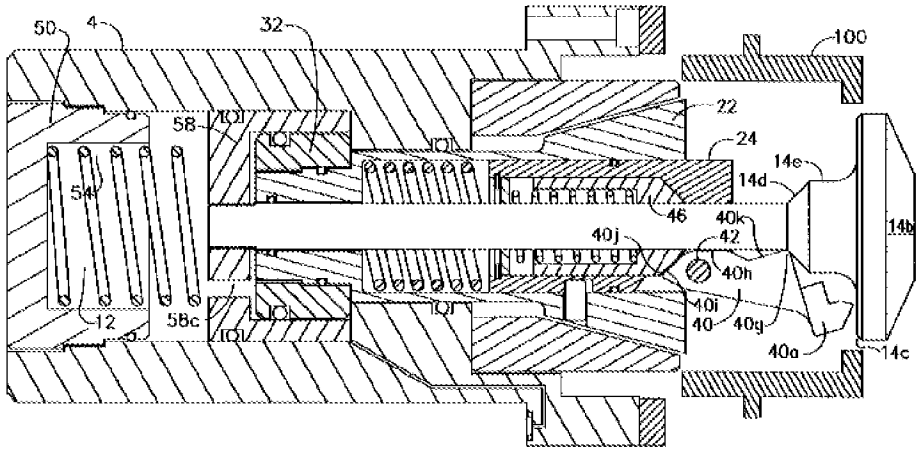


FIG. 2

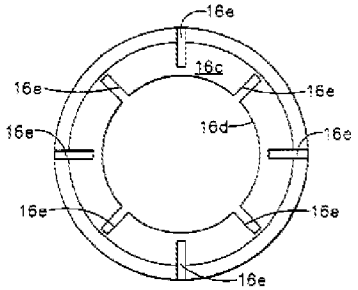


FIG. 5

Claim 2: Clamping device according to claim 1, characterized in that the outer expanding means (6) and/or the intermediate means consists of a sleeve (7).

As per **claim 2**, Dictionary.com Unabridged Dictionary defines “sleeve” as “a tubular piece, as of metal, fitting over a rod or the like.” The same source defines “tubular” as “of or pertaining to a tube”. The same source also defines “tube” as “a hollow, usually cylindrical body of metal, glass, rubber, or other material, used especially for conveying or containing liquids and gases.”

Following this definition, the expanding means (16) is a “sleeve” as it is a “metal”, “hollow” body with a “cylindrical” outer and inner surface that fits “over a rod or the like”

(14a) (Fig 1). Likewise the intermediate means (22) is also a sleeve according to this definition (Fig 1).

Claim 3: Clamping device according to claim 1, characterized in that the hydraulic means include a pressurization chamber (12) arranged at one end of the piston (9), and a relief chamber (13) at the other end of the piston (9), which chambers (12, 13) are capable of being filled and pressurized by a hydraulic pressure medium.

As per **claim 3**, the hydraulic means includes a pressurization chamber (10) arranged at one end of the piston (32) and a relief chamber (12) at the other end of the piston (Fig 1, 2). These chambers are capable of being filled with hydraulic pressure medium as noted above (col 9, 1-10, 23-31).

Claim 4: Clamping device according to claim 1, characterized in that the conicity of the intermediate sleeve (7) is arranged such that the diameter of the intermediate sleeve (7) increases towards its outer end.

As per **claim 4**, the conicity of the intermediate sleeve (22) is arranged such that the diameter of the sleeve increase toward its outer end (Fig 1).

Claim 5: Clamping device according to claim 1, characterized in that the interacting conical surfaces have a conicity so as to be self- locking.

As per **claim 5**, the interacting conical surfaces of the intermediate sleeve (22) and outer expanding means (16) are self-locking. The applicant's specification (p. 7, 9-11) defines "self-locking" as "after pressurization the surfaces cannot slide on each other by themselves because of the radial pressure acting on the conical surfaces." When pressure chamber 10 fills with a hydraulic medium, it pushes piston 32, which is connected to intermediate means (22) causing a radial pressure between the intermediate means (22) and the outer expanding means (16). Since the pressure from chamber 10 does not subside, the radial pressure acting on the conical surfaces does

not subside. The conical surfaces cannot slide on one another in this condition. As such, the conical surfaces are "self-locking".

Claim 6: Clamping device according to claim 1, wherein the piston (9) is arranged in a chamber, characterized in that a sealing means, preferably in the shape of a sealing ring (18), is arranged between the piston (9) and a cylindrical outer wall of the chamber.

As per **claim 6,** the piston is arranged in chamber 10 and a sealing ring (64) is arranged between the piston and a cylindrical outer wall of the chamber (Fig 1).

Claim 7: Clamping device according to claim 1, characterized in that a sealing means, preferably in the shape of a sealing ring (19), is arranged between the centre pin (8) and the intermediate sleeve (17).

As per **claim 7**, a sealing ring (26) is arranged between the center pin (14a) and the intermediate means (22).

Claim 8: Clamping device according to claim 1, characterized in that a sealing means, preferably in the shape of a sealing ring (21), is arranged between the outer sleeve (6) and the intermediate sleeve (7).

As per **claim 8**, a sealing ring is arranged between the outer sleeve and the intermediate sleeve. In Fig 1, the sealing O-ring (23) is arranged between the intermediate means (22) and the housing (4). However, Varnau discloses when referring to seal 23, "any other type of suitable seal may be used, carried by bore 4a or by first cylindrical portion 22b." (col 4, 35-37). If a sealing ring were placed on the part of the cylindrical portion 22b nearest to the frustoconical surface 22a, as envisioned by Varnau as a possible embodiment of his invention, said sealing ring would be "arranged between the outer expanding means and the intermediate means".

Claim 9: Clamping device according to claim 1, characterized in that the device is substantially integrated in the part intended for mounting in a machining device.

As per **claim 9**, Dictionary.com Unabridged Dictionary defines "integrated" as "combining or coordinating elements so as to provide a harmonious, interrelated whole". The clamping portion of Varnau's invention (parts 10, 12, 14a, 16, 22, 32) is integrated according to this definition with the rest of Varnau's invention, but especially with the clamp body 4 (Fig 1). The applicant states the intended use of "intended for mounting in a machining device". Clamp body 4 is cylindrical and, as such, a shaft or "mandrel", as discussed above. Hence, clamp body 4 is capable "for mounting in a machining device".

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Varnau (6,497,419) as applied to claim 1 above in view of Mochida, et al (6,663,548).

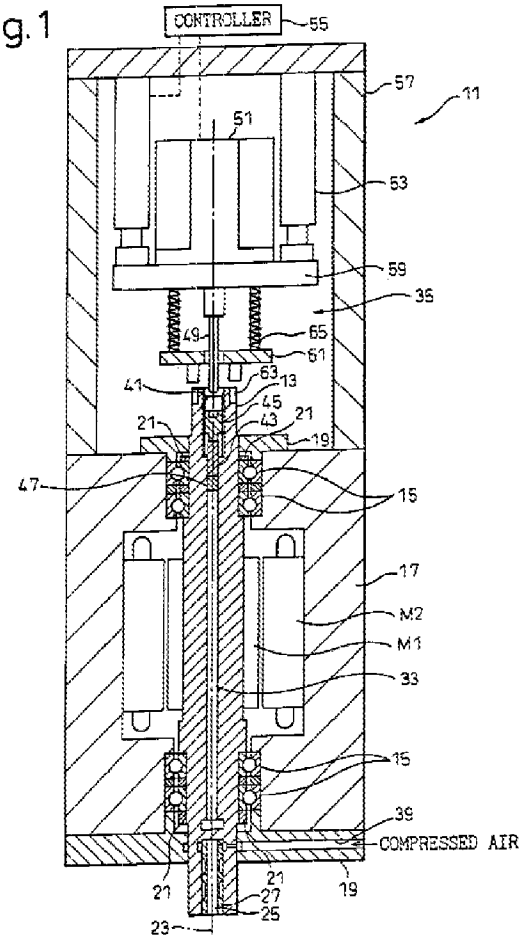
Claim 10: Clamping device according to claim 1, characterized in that the device consists of an integrated portion of a machine spindle.

As per **claim 10**, Varnau discloses a hydraulic clamping device, as stated above. Please see item #4 above for an analysis of claim 1. Varnau does not teach that the device consists of an integrated portion of a machine spindle.

While not positively required in this claim, it is noted that Varnau is silent on the type of workpiece being clamped by his device. However, Varnau does indicate that the

type of workpiece which is suitable for his device is a hollow work-piece as shown in figure 1. hence, a specific tool that Varnau's clamping device might hold would be a shell mill which is a tool that is clamped at the inner diameter by an expanding clamp such as the one taught by Varnau. For a shell mill to function as a tool, the hydromechanical clamp must rotate. Moreover, Mochida, et al disclose a hydraulic clamping device with an expandable sleeve (27) that is integrated into a spindle (13) (Fig 1). The spindle (13) has hydraulic means: "The present relates to a spindle unit for a machine tool having a spindle rotatably held in a housing and a hydraulic tool holding system at a forward end of the spindle and capable of holding a tool on the spindle without a tool holder." (Abstract).

Fig.1



Therefore, it would have been obvious in the art to integrate a spindle to a clamping device of Varnau so that the shell mill on the clamping device is able to rotatably machine a surface of a workpiece. The first improvement upon Varnau of integrating Varnau's clamp in a spindle is the ability to utilize Varnau's invention as a tool holder on a machining device without having to first clamp it to a spindle. Secondly, by integrating Varnau's invention into the spindle in a manner similar to that taught by Mochida, it would be superior to attaching Varnau's invention to a spindle: the integrated spindle and clamp, sometimes referred to as a "holderless type of spindle unit" has the ability of "machining a workpiece of complicated shape," (Mochida, et al,

col 1, 29). The process for improving Varnau was within the ordinary ability of one of ordinary skill in the art based on the teachings of Mochida, et al.

7. Claims 1, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mochida, et al (6,663,548) in view of Varnau (6,487,419).

As per claims 1 and 9, Mochida, et al teaches of a “holderless type of spindle unit" which integrates a hydraulic clamping device with an expandable sleeve (27) that is integrated into a spindle (13) (Fig 1).

However, Mochida does not disclose a device which in one end thereof is designed as a mandrel pin with an outer envelope surface onto which one or more tools may be mounted, characterized in that the mandrel pin comprises outer expanding means (6), the outer surface of which consisting of said envelope surface, with a relatively thin, radially expandable wall and a conical inner surface in the axial direction, the mandrel pin further comprising a centre pin (8), the outer diameter of which being smaller than the diameter of the inner surface of said means, wherein in the space between the centre pin (8) and the expanding means there are arranged intermediate means (7) connected to a piston (9), which intermediate means (7) are displaceable in the axial direction by means of hydraulically operating means, wherein the intermediate means (7) and the outer expanding means (6) have interacting conical surfaces which at axial displacement of the intermediate means in one direction cause radial expansion of the outer expanding means (6), wherein axial displacement of the intermediate means in the other direction causes relief with radial contraction of the outer expanding means (6).

Varnau, however, discloses of each of these elements, as discussed in item #4 above.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the hydromechanical clamp on the invention of Mochida et al with the hydromechanical clamp in Varnau with reasonable expectation that this would result in an improved clamping device for a tool to be used on a machining device. The improvements upon Mochida, et al of adding Varnau's hydromechanical clamp are: a) “Parts," or tools, "with through holes can be easily positioned, clamped and secured on a fixture" (Varnau, col 1, 48-49), b) the clamp can “easily accommodate various configurations of workpieces” or tools, and c) the clamp can “radially and axially hold the workpiece”. The process for improving Mochida, et al was within the ordinary ability of one of ordinary skill in the art based on the teachings of Varnau.

As per claim 10, see element (21) in figure 1 of Mochida for the spindle.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Varnau (6,497,419) as applied to claim 1, and in view of Samelius (WO – 98/32560).

Claim 11: Clamping device according to claim 1, characterized in that the clamping device have follower bores and/or follower pins for connection to corresponding follower pins and/or follower bores of the tool.

As per **claim 11**, Varnau discloses a hydraulic clamping device, as stated above. Please see item #4 above for an analysis of claim 1.

Varnau, however, does not teach follower bores or follower pins on the device.

However, Samelius teaches of follower bores in the hydromechanical clamp. In the mandrel pin (3), a follower bore (6) has within it a corresponding follower pin (7) from the tool (4) (Fig 1).

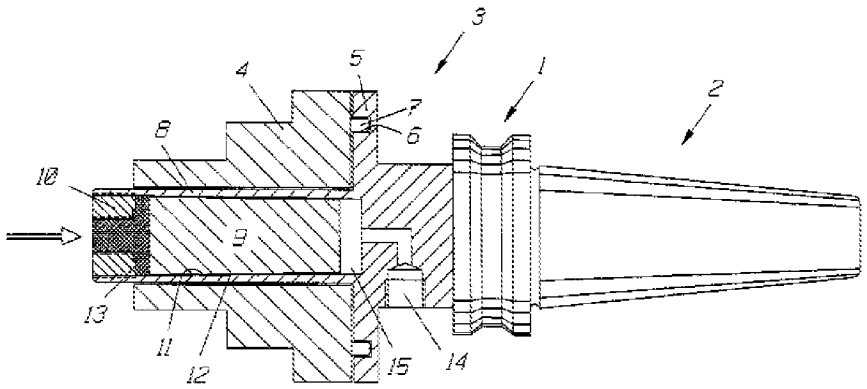


Fig. 1

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to add a follower bore similar to the type taught by Samelius to the hydromechanical clamp in Varnau with reasonable expectation that this would result in an improved clamping device **for a tool to be used on a machining device**. The improvement upon Varnau of adding the follower bore allows the "tool to follow the rotary movement" of the clamp (Samelius, col 3, 10). This is an improvement over Varnau's hydromechanical clamp alone because the follower bores/pins give stability to the rotation of a tool clamped, such as a shell mill. The process for improving Varnau was within the ordinary ability of one of ordinary skill in the art based on the teachings of Samelius.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN BECKER whose telephone number is (571)270-7536. The examiner can normally be reached on Monday-Friday 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sam Yao can be reached on 571-272-1224. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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